Trend Study 7-10-01

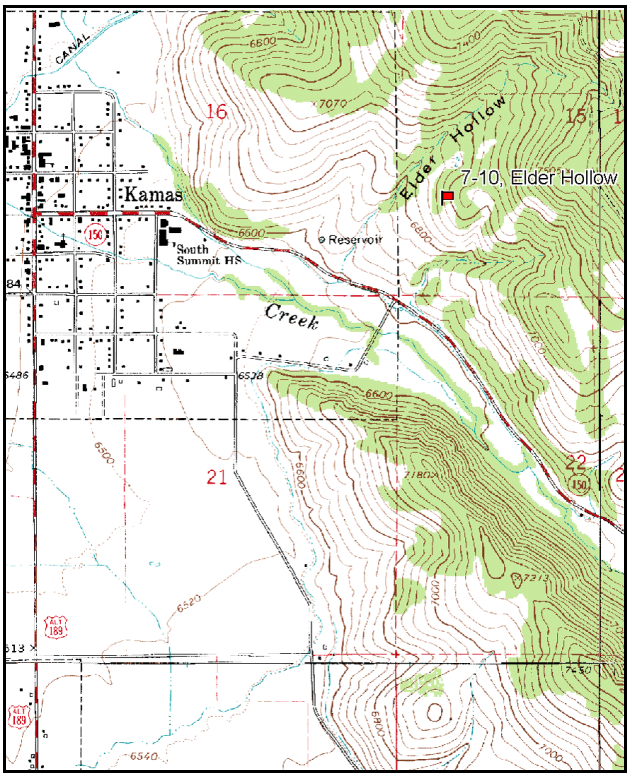
Study site name: Elder Hollow . Vegetation type: Mountain Brush .

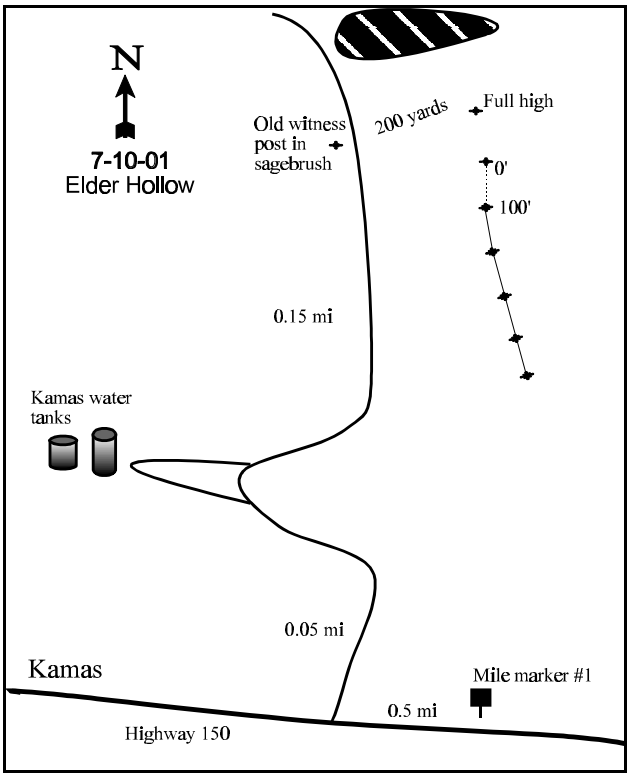
Compass bearing: frequency baseline 169 degrees magnetic.

Frequency belt placement: Line 1 (11ft), Line 2 (59ft), Line 3 (71ft), Line 4 (95ft), Line 5 (34ft).

LOCATION DESCRIPTION

Westbound on Highway 150 (Mirror Lake Highway) from mile marker 1, proceed 0.05 miles to a locked gate on the right. Contact the Wildlife Biologist in the area to obtain a key. The site can also be reached by walking. Proceed through the gate, turn left, travel 0.05 miles, turn right, travel 0.05 miles, bear right, and travel 0.15 miles to green steel stake on the left. The post is in dense sagebrush 3 feet form road. From the post, walk 200 yards at 66 degrees magnetic to a witness post. The 0-foot stake is just a couple of paces south of the witness post. The baseline doglegs down through the same vegetation type. Line 1 runs 169 degrees magnetic. Line 2 runs 151 degrees magnetic. Line 3 runs 149 degrees magnetic. Lines 4 and 5 run 146 degrees magnetic.





Map Name: Kamas

Diagrammatic Sketch

Township 2S , Range 6E , Section 15

UTM 4499007 N 478156 E

DISCUSSION

Trend Study No. 7-10

The Elder Hollow trend study replaces the old Kamas Water Tank trend study established in 1984. The original Kamas Water Tank site sampled critical deer winter range located immediately east of Kamas. When this site was revisited in 1996, the land was for sale. This is a privately owned site that for many years has been intensively grazed by sheep, cattle, and horses. Knowing that this area is important as critical winter range, the study site was moved up the ridge about 200 yards so that the site could be accessible in the future. Furthermore, there was little sign that the old site was used by wildlife, whereas the new site has abundant indications of use. The range type is mountain big sagebrush/grass that also contains an interspersed and diverse population of other shrub species. Elevation of the new site is approximately 7,000 feet. It has a slope of 35-40% and an aspect to the southwest. Deer use was reportedly heavy on the old site, although few pellet groups were present in 1996. Form class analysis of the key browse species indicated only light to moderate use. Wildlife use on the new site is abundant. Pellet group quadrat frequency was 45% for deer and 27% for elk in 1996. During the 2001 reading, pellet group quadrat frequency was 39% for deer and only 3% for elk. A pellet group transect read on the site in 2001 estimated 103 deer, 8 elk, and 6 cow days use/acre (253 ddu/ha, 20 edu/ha, and 14 cud/ha). Most pellet groups appear to be from late winter and early spring use. Cows were on the site within the past few weeks.

Soil is moderately deep with an effective rooting depth of 14 inches. Texture is a sandy clay loam\loam with a neutral soil reaction (7.0 pH). Rock is common on the surface and throughout the soil profile. Protective ground cover of vegetation and litter is abundant but interspaces between shrubs show signs of localized erosion. Terracing along the slope and soil pedestalling on the uphill side of shrubs is common. The erosion condition class was determined as slight in 2001.

The site supports several preferred browse species. These include mountain big sagebrush, serviceberry, bitterbrush, and snowberry. The key species for this site is mountain big sagebrush which made up 72% of the browse cover in 1996 and 61% in 2001. Density of sagebrush was estimated at 2,540 plants/acre in 1996. Utilization was light to moderate, vigor good, and percent decadence moderate at 20%. Approximately 26% of the population consisted of dead plants which appear to have died within the past 10 years or so. Density declined slightly in 2001 to 2,140 plants/acre. Utilization continues to be moderate to heavy. Plants displaying poor vigor increased slightly and percent decadence rose from 20% to 38%. Annual leader growth was poor in 2001 averaging only 1.4 inches. Young recruitment has declined most likely due to the dry spring conditions of the past two years. Spring precipitation (April to June) in 2000 was only 55% of normal at Kamas (Utah climate summaries 2001). Precipitation from April to June was closer to normal in 2001 at 79% of normal, due to above average April precipitation. However, May precipitation was only 28% of normal and June 19% of normal. Dry spring conditions make seedling establishment very difficult.

Serviceberry is moderately abundant with a density of 840 plants/acre estimated in 2001. Mature plants are about 2 feet in height with a crown diameter of nearly 3 feet. Utilization has been moderate to heavy and vigor good. Annual leader growth of serviceberry averaged only 2.3 inches in 2001. The few scattered bitterbrush on the site are heavily browsed but in good vigor. Mature bitterbrush have a low growing, spreading growth form. Average height of mature bitterbrush was only 9 inches in 2001 with a crown diameter of 4 feet. Snowberry has a density of about 1,200 plants/acre. They display mostly light use, good vigor, and low decadence. A few increaser shrubs are found on the site but most occur in limited numbers. Broom snakeweed is abundant but small in stature and providing only 4% to 5% of the browse cover.

Understory growth is limited because of the slope and aspect of the site combined with competition from browse species, especially mountain big sagebrush. A variety of perennial grasses occur on the site but none are abundant. The only common species include Kentucky bluegrass and Sandberg bluegrass. Cheatgrass, an annual, is also moderately abundant. It accounted for 38% of the grass cover in 1996 and 51% in 2001. Forbs are also diverse but most occur only rarely. Common perennials include wavyleaf thistle, redroot eriogonum, silvery lupine, and low penstemon. Annual forbs are also common and produce similar cover as perennial forbs. Annual forbs like pale alyssum, storksbill, and bur buttercup dominate bare areas in the shrub interspaces.

1996 APPARENT TREND ASSESSMENT

The soil trend appears stable with percent bare ground low at only about 6% and a good ratio of bare ground to protective cover (vegetation and litter cover). The key browse species for the site is mountain big sagebrush which provides more than 72% of the browse cover. The population appears stable at this time. The herbaceous understory is dominated by Kentucky bluegrass (an increaser) and cheatgrass (winter annual). These two species contribute 52% of the herbaceous understory cover. There are few desirable forbs on the site. The herbaceous understory is considered stable, but in poor condition because of the composition of increasers and winter annuals.

2001 TREND ASSESSMENT

Trend for soil is slightly down due to an increase in cover for bare ground and a decline in litter cover. Herbaceous cover also declined primarily due to a drop in cover of Kentucky bluegrass. Some erosion is occurring but it is localized and the soil erosion condition class was determined as slight. Trend for browse is stable. Mountain big sagebrush density has declined slightly (16%). Utilization continues to be moderate to heavy with good vigor on all but 29% of the decadent shrubs. Recruitment is currently poor. Serviceberry has increased in density, displays moderate to heavy use, good vigor, with no decadent plants sampled. Snowberry produces 23% of the total browse cover. It has remained stable in density, is only lightly hedged, and in good vigor. Trend for the herbaceous understory is stable. Perennial grasses and forbs are not abundant and combine to produce only 20% cover. Sum of nested frequency for perennial grasses has declined slightly while frequency of perennial forbs has increased slightly. The biggest change for perennial grasses is the significant decline in the nested frequency of Kentucky bluegrass. This is somewhat counterbalanced by a significant increase in crested wheatgrass and Sandberg bluegrass. Kentucky bluegrass is still the most abundant perennial grass. Cheatgrass, an annual, provides half of the total grass cover. It has declined significantly since 1996. Perennial forbs increased slightly in sum of nested frequency. Annual forbs increased substantially and currently produce as much cover as perennial forbs. The largest change comes from the significant increase in bur buttercup.

TREND ASSESSMENT
soil - down slightly (2)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 07 , Study no: 10

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
G	Agropyron cristatum	16	*25	7	8	.28	.47
G	Agropyron spicatum	6	11	2	5	.03	.13
G	Bromus carinatus	10	2	6	1	.08	.01
G	Bromus tectorum (a)	303	*277	80	84	3.80	3.95
G	Carex spp.	17	17	6	6	.36	.28
G	Oryzopsis hymenoides	-	3	-	1	.00	.01
G	Poa fendleriana	4	1	3	1	.06	.00
G	Poa pratensis	125	*65	41	24	4.13	.64
G	Poa secunda	50	*74	20	29	.90	1.96
G	Sitanion hystrix	13	25	6	9	.25	.14
G	Stipa comata	-	8	-	3	-	.06
Total for Annual Grasses		303	277	80	84	3.80	3.95
Total for Perennial Grasses		241	231	91	87	6.12	3.72
Total for Grasses		544	508	171	171	9.93	7.68
F	Agoseris glauca	2	13	1	5	.00	.05
F	Alyssum alyssoides (a)	272	316	79	87	1.76	2.36
F	Arabis spp.	-	1	-	1	-	.00
F	Artemisia ludoviciana	14	26	5	9	.22	.58
F	Arabis perennans	6	-	3	-	.01	-
F	Astragalus convallarius	1	*8	1	4	.00	.21
F	Astragalus spp.	-	-	-	-	-	.00
F	Astragalus utahensis	1	-	1	-	.00	-
F	Camelina microcarpa (a)	-	6	-	4	-	.02
F	Calochortus nuttallii	6	10	3	5	.01	.02
F	Chaenactis douglasii	5	-	2	-	.03	-
F	Cirsium undulatum	35	32	16	13	.56	.91
F	Collomia linearis (a)	-	*14	-	6	-	.05
F	Comandra pallida	7	9	3	3	.06	.09
F	Collinsia parviflora (a)	8	*138	4	53	.04	.53
F	Cynoglossum officinale	-	4	-	1	-	.03
F	Draba spp. (a)	24	5	6	3	.03	.04
F	Epilobium brachycarpum (a)	10	10	5	6	.02	.03
F	Erodium cicutarium (a)	1	*38	1	15	.00	.89
F	Eriogonum racemosum	29	21	17	15	.21	.54

Type	Species	Nested Frequency		Quadrat Frequency		Average Cover %	
		'96	'01	'96	'01	'96	'01
F	Eriogonum umbellatum	-	1	-	1	-	.03
F	Heterotheca villosa	1	5	1	2	.03	.40
F	Holosteum umbellatum (a)	1	*20	1	8	.00	.09
F	Lactuca serriola	-	1	-	1	-	.00
F	Lithospermum ruderale	-	-	-	-	.15	-
F	Lomatium spp.	-	1	-	1	-	.00
F	Lupinus argenteus	13	*45	6	20	.75	2.53
F	Microsteris gracilis (a)	-	*29	-	13	-	.06
F	Oenothera pallida	3	7	1	3	.00	.06
F	Penstemon humilis	42	29	18	12	.87	.48
F	Penstemon spp.	2	4	1	1	.00	.03
F	Phlox longifolia	-	3	-	2	-	.01
F	Polygonum douglasii (a)	8	-	3	-	.01	-
F	Ranunculus testiculatus (a)	60	*211	20	58	.20	2.04
F	Taraxacum officinale	-	5	-	2	-	.01
F	Tragopogon dubius	14	7	6	3	.08	.06
F	Viguiera multiflora	20	*6	8	3	.16	.06
F	Zigadenus paniculatus	3	7	1	3	.01	.10
Total for Annual Forbs		384	787	119	253	2.08	6.15
Total for Perennial Forbs		204	245	94	110	3.21	6.26
Total for Forbs		588	1032	213	363	5.30	12.41

* Indicates significant difference at alpha = 0.10 (annuals excluded)

BROWSE TRENDS --
Herd unit 07 , Study no: 10

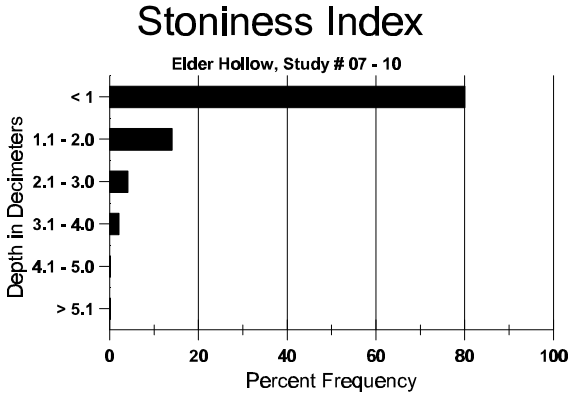
Type	Species	Strip Frequency '96	Strip Frequency '01	Average Cover % '96	Average Cover % '01
B	Amelanchier alnifolia	20	31	1.53	1.84
B	Artemisia tridentata vaseyana	74	73	21.76	18.50
B	Chrysothamnus depressus	3	3	-	-
B	Chrysothamnus nauseosus albicaulis	0	2	-	.03
B	Chrysothamnus nauseosus consimilis	1	1	-	.03
B	Chrysothamnus viscidiflorus viscidiflorus	5	10	.53	.19
B	Eriogonum heracleoides	1	1	-	.00
B	Gutierrezia sarothrae	38	42	1.24	1.41
B	Mahonia repens	4	2	-	-
B	Opuntia spp.	17	13	.54	.16
B	Prunus virginiana	1	0	-	-
B	Purshia tridentata	4	3	.56	.53
B	Symphoricarpos oreophilus	38	46	3.80	6.99
B	Tetradymia canescens	14	14	.21	.46
Total for Browse		220	241	30.20	30.17

BASIC COVER --
Herd unit 07 , Study no: 10

Cover Type	Nested Frequency '96	Nested Frequency '01	Average Cover % '96	Average Cover % '01
Vegetation	461	445	41.93	46.54
Rock	330	295	22.34	19.41
Pavement	255	281	4.72	4.82
Litter	487	459	43.82	38.67
Cryptogams	54	27	.26	.32
Bare Ground	221	260	6.30	13.25

SOIL ANALYSIS DATA --
Herd Unit 07, Study no: 10, Elder Hollow

Effective rooting depth (in)	Temp °F (depth)	PH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
14.1	38.4 (13.2)	7.0	48.2	27.1	24.7	3.7	16.6	198.4	.6



PELLET GROUP FREQUENCY --
Herd unit 07 , Study no: 10

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'96	'01	'01	'01
Rabbit	1	4	104	N/A
Elk	27	3	104	8 (20)
Deer	45	39	1331	102 (253)
Cattle	-	-	70	6 (14)

BROWSE CHARACTERISTICS --
Herd unit 07 , Study no: 10

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Amelanchier alnifolia																		
Y	96	-	-	1	-	-	1	-	-	-	2	-	-	-	40			2
	01	2	-	-	-	-	-	1	-	-	3	-	-	-	60			3
M	96	-	5	9	3	4	3	-	-	-	24	-	-	-	480	22	29	24
	01	2	5	11	3	14	3	1	-	-	38	-	1	-	780	23	30	39

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	35%	54%	00%	+38%
'01	45%	33%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'96	520	Dec:	-
	'01	840		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
Y	96	8	-	-	-	-	-	-	-	-	8	-	-	-	160			8
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
M	96	17	52	25	-	-	-	-	-	-	94	-	-	-	1880	20	44	94
	01	25	32	3	2	1	1	-	-	-	64	-	-	-	1280	22	39	64
D	96	4	11	9	-	-	1	-	-	-	21	-	-	4	500			25
	01	6	21	13	-	-	1	-	-	-	29	-	1	11	820			41
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	880			44
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	560			28

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	50%	28%	03%	-16%
'01	50%	17%	11%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	2540	Dec:		20%
'01	2140			38%

Chrysothamnus depressus																		
M	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	7	17	5
	01	3	2	-	-	-	-	-	-	-	5	-	-	-	100	5	16	5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	+ 0%
'01	40%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'96	100	Dec:	-
'01	100		-

Chrysothamnus nauseosus albicaulis																		
M	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	01	2	-	-	-	-	-	-	-	-	2	-	-	-	40	50	53	2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'96	0	Dec:	-
'01	40		-

Chrysothamnus nauseosus consimilis																		
Y	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'96	20	Dec:	-
'01	20		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus viscidiflorus																		
Y	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	96	6	-	-	-	-	-	-	-	-	6	-	-	-	120	11	19	6
	01	7	3	3	4	-	-	-	-	-	17	-	-	-	340	8	75	17

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	+53%
'01	18%	18%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	160	Dec:		-
'01	340			-

Eriogonum heracleoides																		
M	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20	8	15	1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	+ 0%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	20	Dec:		-
'01	20			-

Gutierrezia sarothrae																		
S	96	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	96	35	-	-	-	-	-	-	-	-	35	-	-	-	700			35
	01	6	-	-	-	-	-	-	-	-	6	-	-	-	120			6
M	96	170	-	-	-	-	-	-	-	-	170	-	-	-	3400	8	12	170
	01	149	-	-	-	-	-	-	-	-	149	-	-	-	2980	7	8	149
X	96	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	-24%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	4100	Dec:		-
'01	3100			-

Mahonia repens																		
M	96	5	-	-	-	-	-	-	-	-	5	-	-	-	100	4	4	5
	01	5	-	-	4	-	-	-	-	-	9	-	-	-	180	2	3	9

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	+44%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	100	Dec:		-
'01	180			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Opuntia spp.																		
Y	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	96	24	-	-	2	-	-	-	-	-	25	-	1	-	520	4	12	26
	01	12	-	-	2	-	-	-	-	-	14	-	-	-	280	4	8	14
D	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	07%	-39%
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	560	Dec:		4%
'01	340			0%

Prunus virginiana																		
M	96	-	-	-	1	-	-	-	-	-	1	-	-	-	20	-	-	1
	01	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	00%	
'01	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'96	20	Dec:	-
'01	0		-

Purshia tridentata																		
M	96	-	-	4	-	-	-	-	-	-	4	-	-	-	80	10	51	4
	01	-	1	2	-	-	-	-	-	-	3	-	-	-	60	9	50	3

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	100%	00%	-25%
'01	33%	67%	00%	

Total Plants/Acre (excluding Dead & Seedlings)			
'96	80	Dec:	-
'01	60		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	96	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1
Y	96	10	1	-	-	-	-	-	-	-	11	-	-	-	220			11
	01	6	-	-	1	-	-	-	-	-	7	-	-	-	140			7
M	96	27	5	-	19	-	-	-	-	-	51	-	-	-	1020	21	30	51
	01	31	4	1	10	-	-	6	-	-	51	1	-	-	1040	22	33	52
D	96	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	10%	00%	02%	- 5%
'01	07%	02%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	1260	Dec:		2%
'01	1200			2%

Tetradymia canescens																		
Y	96	5	-	-	1	-	-	-	-	-	6	-	-	-	120			6
	01	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
M	96	16	-	-	-	-	-	-	-	-	16	-	-	-	320	8	18	16
	01	15	3	-	1	-	-	1	-	-	20	-	-	-	400	9	14	20
D	96	2	-	-	-	-	-	-	-	-	1	-	-	1	40			2
	01	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'96	00%	00%	04%	- 8%
'01	14%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'96	480	Dec:		8%
'01	440			5%